

INTRAPERITONEAL RUPTURE OF THE BLADDER.¹

By CHARLES K. BRIDDON, M.D.,

OF NEW YORK,

SURGEON TO THE PRESBYTERIAN HOSPITAL.

THE following histories of intraperitoneal ruptures of the bladder are all that I have been able to find in the records of my own service in the Presbyterian Hospital. I was much impressed with the unfavorable outcome of the cases, and, believing that a more successful treatment could only come out of recorded failures, I have presented them to the Surgical Society.

CASE I.—Reported by Dr. Marvin. M. L., aged forty-eight years, Ireland, married, mason, was brought in on the ambulance, December 3, 1888; had been suffering since the day before with severe abdominal pain; denies intoxication, and emphatically denies having received any injury; did not sleep at all on account of the pain which he has had; no intermission; it is situated mostly in the hypogastric region, but extends into the left side; he also complains bitterly of an incessant desire to pass water and inability to do so; soft catheter passes easily, and gives issue to about eight ounces of bloody urine; reaction acid; color deep red; sediment 10 per cent.; specific gravity 1020; filtered solution albumen, 4 per cent.; blood and pus-cells in abundance. The pain continued after admission, and was of a very severe character, requiring hot stupes and the hypodermic use of morphine; in a few hours he again complained of the intolerable desire to urinate, which was relieved by the previous catheterism; the instrument was again introduced, and drew off eight ounces of clear urine. Testicles still retracted, and abdominal muscles so tense that nothing is revealed by palpation. Catheter used at 3 P.M. and at midnight.

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December 4, at 4.30 A.M. Patient had severe attack of abdominal pain; testicles retracted, right one into inguinal canal, and great annoyance from desire to micturate; pain from abdomen passes down into the glans penis; color of urine amber; specific gravity 1026; albumen only a trace; mucus, blood, and pus-cells.

4 P.M. Patient again examined by the attending surgeon; he still denies intoxication or injury; his abdomen is tympanitic and extremely tender.

December 5. Condition unchanged, except that pulse is more frequent; he still has to be catheterized; urine acid, coffee-colored; specific gravity 1020; trace of albumen.

It was now determined to make an exploratory laparotomy. Chloroform anæsthesia was used; an incision four inches long was made in the median line above the pubis; when the peritoneum was opened more than three pints of fluid escaped. The cavity was then explored; on the posterior wall of the bladder near the fundus was found a lacerated wound one and a half inches in length, extending obliquely from above downward and to the left; a catheter passed "per urethram" was felt through the wound. The abdominal incision was enlarged sufficiently to permit of the necessary manipulation; the posture being changed to that of Trendelenburg, and the rent was closed by nine catgut sutures. The peritoneal cavity was then thoroughly cleansed with hot water; a glass tube was placed in the lower angle of the wound, the remainder of which was closed with silkworm-gut sutures; a soft rubber catheter was retained in the bladder. When the patient was returned to the ward his pulse was 150, and very feeble; respiration 23, and entirely thoracic; every hour during the night the drainage-tube was kept clear by exhaustion with a syringe; ether, camphor, and stimulants were freely used.

December 6, 1 A.M. Patient had entirely recovered from the effects of the anæsthetic; his pulse 132, small, and compressible, and could only be maintained by hypodermic injections of camphorated ether; a fair amount of urine was passed through the catheter, but from this time on, and in spite of the most energetic stimulation, he gradually sank and died at 10 A.M.; every effort was made to procure an autopsy, but the officials did not succeed.

CASE II.—Reported by Dr. Ross, W. S., aged twenty-one years; single; Ireland; driver of ice-wagon. Family history negative. Patient uses whiskey, and was drunk when accident occurred.

About 7 A.M., February 24, 1890, patient fell from his ice-wagon

in such a way that both wheels are said to have passed over his loins. The right side was uppermost, and was much bruised. Since the accident he has passed no urine. When found, he was in a condition of partial stupor, and complained of pain across the abdomen.

He was brought to the hospital in an intoxicated condition; slept for two or three hours in the accident ward; then he began to complain of severe abdominal pain and constant desire to micturate. Brought to the ward, and at that time semipriapism noted.

A catheter was passed, and twenty-three ounces of bloody urine were drawn. Pain relieved by one-third grain morphine hypodermically.

Physical examination of abdomen at that time negative. At one o'clock abdominal distention noted with increase of abdominal pain. At 3 o'clock a catheter was passed, and four ounces of bloody urine withdrawn. Upon manipulation of end of catheter in the bladder it suddenly appeared to slip into another cavity, and was followed by the withdrawal of ten ounces of decidedly bloody fluid. Diagnosis of rupture of bladder made. Patient placed upon the operating table.

Operation 3.30 P.M.; finished 5.30 P.M.; chloroform ether narcosis. Every attention was paid to antiseptic detail; an incision was made in the median line, commencing three inches below the umbilicus and terminating about half an inch above the symphysis pubis. The incision was deepened until the peritoneum was reached; the muscles in the wound's lower angle were somewhat contused; the peritoneum was picked up with anatomical forceps and divided; from four to six ounces of fluid escaped when this was done; the index-finger was introduced into the abdominal opening, and immediately the rent in the bladder was recognized. A large flat sponge held back the intestines above, and with remarkable ease the ruptured organ was brought through the opening in the abdomen and exposed well to view. Before exposing it thus the fingers could be carried down through the interior of the bladder, and the sphincter vesicæ and neck of the bladder could be made out.

The tear was about two and three-quarters inches in length, its edges were rather ragged, and its position was in the fundus. Thirteen fine sutures passing through the visceral peritoneum and muscular wall were used in bringing the torn surfaces into apposition. An endeavor was made to avoid the mucous membrane in the sewing, but it was thought two sutures passed through the mucous membrane.

The upper part of the abdominal wound and the intestines were shut off by a large flat sponge, and the lower part of the wound and the region about the repaired bladder were flushed with hot water sterilized.

A large glass tube was placed in the lower angle of the wound, passing downward and forward. The margins of the wound were approximated with interrupted sutures of silkworm gut with intervening catgut sutures. An antiseptic absorbent dressing was applied.

Patient was next put in the lithotomy position, and a grooved sound passed into the bladder. The sound was given to an assistant, who also held the scrotum well forward, keeping the raphé exactly in the median line. The perineal region was made aseptic, and an incision was made down upon the staff's groove into the bladder. There was a very small amount of hæmorrhage. A large rubber tube was then passed into the crippled organ, and was held in place by a silk suture passed through the soft parts. The bladder was irrigated; tube surrounded with absorbent cotton.

February 25. Recovered from ether without vomiting, but had considerable pain during the night, quieted by use of morphine. During the night there was considerable bleeding from perineal wound. It continued about five hours, but was eventually checked by pressure.

A strip of gauze was inserted into the tube, and from time to time during the night was removed without disturbing the patient. Thus drainage was provided for.

Temperature went to 100.6°-99.6° F.; pulse 120; respiration 36. Patient almost free from pain. There is less distention.

February 26. Tympanites increased, and, later, vomiting added to his suffering; first the contents of his stomach, and later a yellowish-green matter thin as water. There was an interval of four hours (from 4 to 8 P.M., 25th) when there was no vomiting, then it reappeared; it was pronouncedly of the peritonitis type. Gastric lavage was commenced at 11 P.M., and one quart of thick, offensive, greenish matter was removed; the water used for the lavage was of a temperature of 102° F., and the operation was continued every four hours during the night. Large quantities of gas came out with each washing. Pulse 150; temperature 99° F.; respiration purely thoracic and 32. Lavage every two hours; matter less offensive and not so thick, but green.

After each wash, a half ounce of whiskey (hot) and the same

quantity of water was put into the stomach through tubes, and two ounces of peptonized milk given.

February 27. Pulse 146; respirations 28; temperature ranges 99° to 102° F.

Patient was given an enema of one ounce of glycerin, one ounce of sulphate of magnesia, and six ounces of water, this was repeated in four hours, and was followed by a dark unformed movement.

Lavage continued up to 3.30 A.M. (27th), effecting a diminution in the tympanites and an amelioration of his other symptoms. Gas again, in large quantities, escaped through the tube at each washing. One dose of one ounce of whiskey (hot) and ten minims of tincture strophanthi were given through the tube.

February 28. There has been no vomiting during the past 24 hours; the abdominal distention has grown steadily greater; emaciation has been great and progressive; pulse rapid and failing; temperature range 100° to 102° F.

Patient bears the appearance of a man after weeks of wasting disease,—a marked contrast from his robust appearance on admission. There is mild delirium.

3 P.M. Extremities cold, cyanotic; Hippocratic countenance.

Death occurring February 28, at 6.31 P.M.

CASE III.—Reported by Dr. Francke. R. P., married; birth-place, United States; occupation, ice-man.

Previous history: Patient was treated in the hospital, during a few days in the month of July, this year, for cellulitis of arm. He developed symptoms of delirium tremens, and was transferred to Bellevue Hospital.

Present history: While unloading ice from a wagon, about 6 P.M., on August 13, he slipped and fell. A large piece of ice fell on top of him, striking him on the abdomen. He went to his home, and states that he felt no bad effects from his injury, until early on the morning of August 24, when he began to suffer from severe pain in the region of the epigastrium. On attempting to urinate, he passed one or two ounces of "blood." An ambulance was summoned, and he was taken to the hospital.

On admission: Temperature 98.2° F.; pulse 82; respiration 30.

Examination by visiting surgeon, 11.30 A.M. Condition fair; hypogastric and inguinal regions moderately distended, dull on percussion, the dulness fading out laterally and above; there was no such distinct tumor as is met with in distended bladder, and no

bulging in the rectum; a silver catheter was passed, and evacuated a quantity of bloody urine.

Diagnosis: Rupture of bladder; intraperitoneal operation; ether narcosis.

The patient being placed in the Trendelenburg position, with the head towards the window, so that the rays of light might fall directly into the pelvis, an incision, three inches long, was made in the median line, directly above the pubes, until the bladder was exposed below the reflection of the peritoneum. It was opened on a sound, previously introduced, and temporary loops were introduced through the middle of the incision. These served to steady the organ and to draw it towards the surface. The opening gave exit to a very large amount of blood-clot and urine. A finger introduced passed readily through a large rent in the posterior surface of the bladder. The peritoneum was now opened, and the abdominal incision enlarged upward to within two inches of the umbilicus. In this situation, also, was found a large amount of blood-clot, bloody serum, and urine. The exact amount was difficult to estimate. A vertical wound was found in the posterior wall of the bladder, passing from fundus to base in the middle line, its length at least two inches, its edges ragged and bruised. A blunt hook passed through the incised wound in the anterior wall and out through the rent, served to draw the bladder to the surface. The place of this instrument was then taken by a loop of silk, passed through the upper angle of the rent, and supplemented by two other loops passed through the middle of the rent. These temporary loops served to draw the organ to the surface, facilitating, to a marked degree, the introduction of silk sutures passed through the peritoneal and muscular tunics, bringing everything into accurate apposition. The abdominal cavity was then cleaned of clots, serum, and urine by repeated copious irrigation with hot water; the toilet completed by drying as completely as possible, and the edges of the wound effectually secured by silkworm gut. This adjustment was made so as to permit the introduction of a drain into the cavity of the peritoneum, which lay along the line of sutures in the bladder, and a T-drain in the bladder, but with no possible communication and no danger of infection of the former from the secretions of the latter. Patient left the table in fairly good condition. He was sent to ward, the foot of the bed elevated, heat applied to surface of body.

After operation patient vomited a considerable quantity of dark-

brown fluid. At 4 P.M. temperature had risen to 102.8° F.; pulse 132; respiration 46. Temperature continued to rise steadily, and at 8 P.M. was 104.2° F., when an alcohol bath was given. At 10 P.M. catheterized without result. At 11.30 P.M., pulse being very weak, he was given hypodermically strychnine sulphide one-thirtieth grain, camphor and ether twenty minims.

August 25, at 1 A.M. Temperature had risen to 104.6° F., and patient was restless. Died at 3.30 A.M.

Autopsy.—Dr. Tuttle. The rent in the bladder was found to measure two and three-quarters inches. The sutured wound was clean and apparently tightly closed. There was no effusion of urine or other fluid into the peritoneal cavity. The other abdominal viscera were normal, with the exception of the kidneys, which showed some evidence of nephritis.

Remarks.—I think it is a common impression with the general practitioner that ruptures of the bladder are always caused by violence; that such is the cause in the great majority of instances there can be no doubt, and that it also occurs most frequently in persons under the influence of alcohol is equally certain. Such a condition fills the bladder rapidly, and the sense of repletion is not recognized by the brain; but there are quite an array of cases in which there has been no history of trauma, cases in which the organ has given way under the combined influence of distention from within and muscular action from without. There are over fifty such cases on record due to strictures of the urethra or prostatic obstructions; in some cases to some inherent weakness of the bladder, tunicary hernia; supplementary pouches caused by protrusion of mucous membrane, through intervals in the muscular coat. In some cases the rupture has occurred through some part of the bladder that has been thinned by ulceration, tubercular or malignant, and I strongly suspect the accident that occurred in the first of those reported in this paper was due to such condition, the absence of trauma and the very obscure character of the earlier symptoms would appear to warrant such conclusion, and it was unfortunate that we were not able to obtain the post-mortem investigation that would have cleared up the doubt. At the same time I must express my opinion that it is not always prudent to place implicit confidence

in the information given by the patient, when it conflicts with the evidence of one's own judgment. I well remember a man who was brought into the hospital, with slight or no symptoms of shock, but with a rapidly-increasing tumor in the region of the kidney, which was believed to be due to rupture of that organ, yet this patient in the presence of a contemplated operation denied intoxication and injury. A free opening in the loin, which evacuated a quart of stinking bloody urine, displayed to view a badly-ruptured kidney, and one month after he admitted that he had been engaged in a drunken fight.

If the accident occurs to a sober person, or to one only slightly inebriated, there will probably be a sense of something having given way, of intense pain in the lower abdomen, a sense of faintness, and disposition to vomit. Shock is generally a pronounced symptom, but there are many cases on record in which it was absent, some in which the patient walked one or more miles to obtain relief, and a few cases in which visits were made to the surgeon once and twice a day for several days preceding the fatal event.

Simultaneously with, or very soon after, the fatal explosion comes urgent desire and inability to pass urine; sometimes the patient may succeed in passing a few drops or ounces of bloody urine; a catheter introduced with ease cannot be rotated as in the distended bladder, and occasionally after removing a very small quantity of bloody urine may by some successful manœuvre be passed through the rent in the bladder into the cavity of the abdomen, and give issue to a still larger quantity of urine.

It will soon be noted that there is a more or less defined and fluctuating swelling in the hypogastrium; it does not have the definiteness of a distended bladder, but shades off laterally and above; it is exquisitely tender and dull on percussion. These conditions will soon be followed by those of septic peritonitis, the characteristic vomiting, elevation of temperature, frequent pulse, distended tympanitic abdomen, haggard, pinched expression of countenance, and where you have such an assemblage of symptoms, there can be but little difficulty in coming to a conclusion as to the nature of the case, but once in a while some of the phenomenon are wanting, and there may be reasonable doubt

as to the true nature of the case. In some such conditions it has been considered proper to inject some sterilized or antiseptic fluid through the urethra. Of course, this ought to furnish decisive evidence by causing the formation of a circumscribed tumor in cases in which the bladder was intact, which disappears when the fluid is permitted to return, the amount of fluid recovered in this way equalling the quantity introduced. I regard the institution of this measure as of very doubtful utility, and not free from the danger of spreading the infection over a larger area than that already involved by the existing extravasation, and it also incurs the danger of breaking up such adhesions as do occasionally limit the effusion.

Ten years ago, Walter Rivington, surgeon to the London Hospital, gave to the profession a very careful study of "rupture of the urinary bladder," based on the records of more than 300 cases. In this are the reports of eight cases of reported recovery after intraperitoneal ruptures, of which he makes a very careful analysis, rejecting six, and leaving only two authenticated cases of recovery.

As far as the treatment of this very serious lesion is concerned, these records afford very little encouragement. It consisted in vigorous local and general depletion, the free use of opium, regular use of the catheter, perineal section, and in one case abdominal section, closure of the rent, cleansing of the cavity of the peritoneum, and closure of the abdominal wound.

Our present knowledge of the inevitable septic processes that follow such accidents, and our familiarity with the successful results that follow prompt and decisive action in kindred conditions menacing the integrity of the peritoneum, must influence our judgment and outline our treatment in the future, but to be successful the institution of such measures must follow immediately upon the accident; procrastination must be fatal. In the first case reported in this paper, in which we were handicapped by having to deal with a patient who denied intoxication and injury, operation was done on the fifth, and he succumbed on the sixth day. In the second case operation was done eight hours and thirty minutes after the accident, and he died on the fourth

day. In the third case, a man saturated with alcohol, the accident occurred at six in the evening; the patient was brought to the hospital the following morning; the operation was done at 11.30 A.M., seventeen hours and a half after the injury, and he died on the second day. These facts do not prove that the procedures adopted were not those best adapted to meet the requirements, but that they were used when the septic processes had made such headway as to be beyond control.

In my operative treatment of the second case, I thought I had stumbled on an ideal method; the lower end of a four-inch median incision was deepened in its lower part until the bladder was opened for exploration; it gave an excellent view of the rent in the posterior wall, and when the peritoneum was freely opened a short, beaked sound introduced through the operation wound in the bladder and then through the rent, enabled my assistant to lift the latter into the abdominal wound and greatly facilitate its suture. It was designed to leave the bladder open for drainage and to close the abdominal wound, but the objection to this method is that in most, if not all, of these cases it is necessary to drain the peritoneum, and the opening of the two drains in such close proximity would be a dangerous source of infection.

My present convictions are that the proper course to pursue in all cases of intraperitoneal ruptures of the bladder will be to open the peritoneum, close the rent in the bladder securely by closely-applied silk sutures, to irrigate the abdominal cavity with hot sterilized water, only close the upper portion of incision in its walls, filling the lower end with a tamponnade of gauze passed to the bottom of the pelvis; to drain the bladder by means of a large flexible catheter passed through a perineal incision, and maintained there by any device that fulfils the indication.

As soon as the characteristic green vomiting occurs I would advise lavage, and immediately after emptying the stomach, the introduction through the tube of liberal doses of sulphate of magnesia, sufficiently frequent and large to ensure drainage of the peritoneum through the medium of the intestinal mucous membrane.